

CLAIMS

1. In a method of preparing a bonded sputter target/backing plate assembly comprising a target composed of a metal or alloy to be sputtered and an underlying metallic backing plate member, an improved method for joining said target and backing plate along mating surfaces thereof, comprising:
  - 5 a) forming a plurality of salient portions in at least one of said mating surfaces;
  - b) positioning said target and backing plate adjacent each other to form an assembly having an interface defined by said mating surfaces;
  - 10 c) pressure consolidating said assembly under low temperature conditions.
2. Method as recited in claim 1 wherein said assembly comprises a peripheral boundary surrounding said projections and wherein said method comprises the additional step of bonding said assembly proximate said peripheral boundary.
3. Method as recited in claim 2 wherein said step (d) is performed after said step (b) and before said step (c).
4. Method as recited in claim 3 wherein said step (d) comprises e-beam welding of said peripheral boundary.
5. Method as recited in claim 4 wherein said step (d) further comprises interposing a weldable filler material between said target and said backing plate proximate said peripheral boundary.
6. Method as recited in claim 2 wherein said step (d) comprises friction welding.

7. Method as recited in claim 2 wherein said step (d) comprises TIG welding.
8. Method as recited in claim 1 wherein said target comprises Al, Cu, Ti, Co or their alloys.
9. Method as recited in claim 6 wherein said backing plate comprises Al, stainless steel, Cu, Ti or their alloys.
10. Method as recited in claim 6 wherein said target comprises Cu.
11. Method as recited in claim 2 wherein said step (d) comprises e-beam welding said target along an annular zone located adjacent said peripheral boundary.
12. Method as recited in claim 1 wherein said step (c) comprises pressure consolidating said assembly at about room temperature.
13. Method as recited in claim 2 further comprising (e) low temperature annealing said pressure consolidated assembly.
14. Method as recited in claim 1 wherein said low temperature is a temperature of less than 50% of the melting temperature of the lower melting member of the target and backing plate.
15. Method as recited in claim 1 wherein said low temperature is less than about 100°C.
16. Method as recited in claim 15 wherein said low temperature is less than about 38°C.

17. Method as recited in claim 16 wherein said low temperature is about room temperature

18. Method of bonding a sputter target to a backing plate member along a plane defined by mating interfacial surfaces of said target and backing plate, said method comprising:

- a) forming a plurality of salient portions in one of said interfacial surfaces, wherein said salient portions have at least one edge and a projection tip connected to said edge.
- b) positioning said target and backing plate in a position ready for bonding with said interfacial surfaces adjacent each other, and
- c) consolidating said target and backing plate at a temperature of less than about 50% of the melting point of the lower melting member of said target and said backing plate and at a pressure sufficient to deform said at least one edge so that at least one edge forms a re-entrant angle relative to said plane of less than  $90^\circ$  and said projection tip forms an angled, locking grip over the other of said interfacial surfaces.

19. Method as recited in claim 18 wherein said step (c) is conducted at a temperature of less than  $200^\circ\text{C}$ .

20. Method as recited in claim 19 wherein said step (c) is conducted at a temperature of less than about  $38^\circ\text{C}$ .

21. Method as recited in claim 20 wherein said step (c) is conducted at about room temperature.

22. Method as recited in claim 18 wherein said target is Al or Al alloy.

23. Method as recited in claim 18 wherein said target is Cu or Cu alloy.

24. Method as recited in claim 18 wherein said target and backing plate have a peripheral boundary portion circumscribing said salient portions, said method further comprising, prior to said step (c), a step (d) of bonding said target and backing plate member around a peripheral boundary portion of said mating  
5 interfacial surfaces.

25. Method as recited in claim 24 wherein said step (d) comprises interposing a weldable filler material between said target and said backing plate along said peripheral boundary portion.

26. Method as recited in claim 24 wherein step (d) comprises e-beam welding.

27. Target/~~Backing~~ plate assembly made by any one of the preceding claims.

28. Combination comprising a sputter target and backing plate, said target and backing plate mating along a plane defined by mating interfacial surfaces of each, a plurality of salient portions formed in one of said interfacial surfaces and having at least one edge and a projecting tip connected to said edge, said edge being  
5 bent at a re-entrant angle of less than about  $90^\circ$  relative to said plane and said projecting tip forming an angled locking grip extending into and over the other of said interfacial surfaces.

29. Combination as recited in claim 28 further comprising a peripheral zone surrounding said salient portions, and a bondable filler material positioned in said peripheral zone.

30. Combination as recited in claim 28 wherein said backing plate comprises Al alloy and said target comprises Al, said salient portions comprising substantially "M" cross sectioned ridges formed in said backing plate with said

ridges provided along said interfacial surface of said backing plate in a plurality of  
5 concentrically arranged rows.

31. Combination as recited in claim 28 wherein said target comprises Cu.

32. Combination as recited in claims 28 wherein said salient portions  
included substantially "M" shaped cross-sectioned ridges and wherein said at least  
one edge is bent at an angle of about 35-80°.

33. Combination as recited in claim 28 wherein said salient portions  
include substantially "V" shaped cross-sectional ridges, each said "V" shaped ridge  
having a pair of edges bent at re-entrant angles.

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